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ABSTRACT

Two models for research on teacher thinking are discussed: the decision-making model and the information-processing model. Research on teaching guided by the decision-making model focuses upon explaining and understanding deliberate teacher activity and is deemed more appropriate for situations in which the teacher has sufficient time and incentive to deliberately decide what to do than it is in the fast-paced context of classroom interactions. In contrast, the information-processing model focuses on how the teacher limits and structures the environment in which he or she must act. Two studies, one using the decision-making model and the other the information-processing model, are examined. It is hypothesized that differences in these areas are due mainly to differences between the models used to conceptualize and guide the research. It is generally concluded that research guided by a decision-making model of teaching tends to be highly controlled, focusing on the decision-making behavior of teachers in situations defined by the researcher. Research guided by the information-processing model, on the other hand, tends to be descriptive, exploring the ways teachers define the situations in which they work and how they cope with a complex classroom environment. (JD)

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CHOICE OF A MODEL FOR RESEARCH ON TEACHER THINKING

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Abstract

Choosing a model for research on teacher thinking is an important, but previously unexamined issue. Researchers often choose a method for addressing a particular set of questions without reflecting on the model implicated by that method. This paper discusses two models for research on teacher thinking: the decision-making model and the information-processing model. The models are then compared through studies in which they are employed.

Choice of a Model for Research on Teacher Thinking

Christopher M. Clark[1]

Research on teacher thinking is a relatively new approach to the study of teaching. This approach is based on the assumption that what teachers do is affected by what they think. The study of teachers' thinking processes -- of how teachers gather, organize, interpret, and evaluate information -- is expected to lead to an understanding of the uniquely human processes that guide and determine teacher behavior

Research on teacher thinking developed as a logical outgrowth of research approaches that emphasize teacher behavior. The teacher behavior approach has contributed a great deal to our knowledge of what teachers and students do in classrooms and how this behavior relates to student learning and attitudes (Rosenshine, 1971; Dunkin & Biddle, 1974; Medley, in press). But if the results of such research are to be applied by individual teachers in their classrooms, adaptations will have to be made, for each class consists of a unique combination of personalities, constraints, and opportunities. Teacher behavior that is sensible and effective in one setting may be inappropriate in another, and it is the individual teacher who has to define the teaching situation and make decisions about appropriateness. So, if research is to be put into practice -- if the general case is to be applied in particular situations -- then researchers must know more about how teachers exercise judgment, make decisions, define appropriateness, and express their thoughts in their actions.

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Several metaphors for the teacher have been used to describe various aspects of this view of teaching. The teacher has been called a clinical information processor (Shulman & Elstein, 1975; National Institute of Education, 1975a), a decision maker (Shavelson, 1976; Clark & Joyce, 1975), a planner (Yinger, 1977), a diagnostician (Vinsonhaler, Wagner, & Elstein, 1977), and a problem solver (Joyce & Harootunian, 1964). This multiplicity of metaphors suggests that there are several different models of teaching underlying the small but growing collection of literature on research on teacher thinking. The purpose of this paper is to demonstrate the importance of the researcher's choice of a model or framework within which to pursue questions and issues concerning the mental lives of teachers.

The role of models in behavioral science research has been explicated by a number of philosophers of science and educational theorists (e.g., Kaplan, 1964; Bakan, 1967; Kuhn, 1970; Snow, 1973; NIE, 1975b). Their basic message is that the model selected or the way of thinking about the phenomena under study shapes and limits the kinds of research questions asked, the methods of inquiry employed, and the rules of evidence used to analyze and interpret data. In short, the researchers suggest, the model underlying a piece of research exerts profound influence from the intial conceptualization of the research through the completion of the final report. Yet, as Kuhn (1970) and others point out, the choice of a model is often made implicitly or by default. Researchers, for example often choose a method for attacking a particular set of questions without reflecting on the model implicated by that method. But the choice of a model for research on teacher thinking is too important to be left unexamined.

Decision-Making Vs. Information-Processing Model

In the research on teacher thinking conducted to date (for a review, see Clark & Yinger, 1977), two models seem to dominate: a decision-making model and an information-processing model. In the former, the teacher is seen as someone who is constantly assessing situations, processing information about those situations, making decisions about what to do next, guiding action on the basis of those decisions, and observing the effects of the actions on students. Shavelson (1976) identifies five features of teacher decision making: alternative acts, states of nature, decision outcomes, utility for the teacher, and goals that the decisions are intended to achieve. Using concepts from statistical models of decision theory, Shavelson develops a formal model of teaching as decision making under uncertainty.

The information-processing model focuses much less on the decisions that teachers must make. Rather, it describes the teacher as a person who, faced with a very complex task environment, copes with that environment by simplifying it, i.e., by attending to some small number of aspects of the environment and ignoring others. The simplified portions of the task environment are called problem spaces. The central questions in the information-processing approach are: 1) How does the teacher's information-processing capacity limit and influence the ways in which complex task environments are simplified into problem spaces? and 2) How do the definitions of particular kinds of problem spaces influence subsequent teacher thinking, classroom interaction, and student learning?

Research on teaching that is guided by the decision-making model seems to focus on explaining and understanding deliberate teacher activity.

Jackson (1968) and Shavelson (1976) both indicate that the decision-making model is more appropriate for situations in which the teacher has sufficient time and incentive to deliberately decide what to do (as in teacher planning) than it is in the fast-paced context of classroom interaction. The information-processing model, in contrast, focuses on how the teacher limits and structures the environment in which he or she must act. Research guided by the decision-making model asks the question "Given a particular situation, how do teachers decide what to do?" The corresponding question for research framed by the information-processing model is "How does a teacher define a teaching situation, and how does the teacher's definition of the situation affect his or her behavior?"

It could be said, of course, that the decision-making and information-processing models are really two sides of the same coin--that the apparent differences are merely matters of emphasis. But even if this is true, the differences between the models are important enough to have noticeable effects on the research that they guide.

Comparing Models in Two Studies

The differential effects of the decision-making and information-processing models can be seen through a comparison of two studies of teacher thinking. The first study, conducted by Peterson, Marx, and Clark (in press), made use of the decision-making model, while the second, by Marland (1977) used the information-processing model. These two studies will be contrasted in terms of the (1) nature of the research questions posed (2) the methods used to answer these questions, and (3) the nature of the results obtained. My thesis is that differences in these areas are due mainly to differences between the models used to conceptualize and

guide the research.

Overview of the Studies

In the Peterson, Marx, and Clark (in press) study, 12 experienced teachers each taught a social studies lesson to three different classes of eight randomly assigned junior high students on three different days. All class sessions were videotaped. At the end of each day, the researchers interviewed each teacher, using a stimulated recall technique to elicit self-reports of cognitive processes during instruction.

Marland (1977) studied the interactive thoughts of six teachers in two schools, two each at the first-, third-, and sixth-grade levels. The teachers participated in two stimulated recall sessions, using videotapes that had been made of language arts and mathematics lessons they taught in their regular classrooms.

At this level of description, the two studies seem rather similar, except for the contrasts in grade levels, subject matter, and laboratory versus naturalistic setting.

Research Questions

In the study of teacher decision making, the major research question was "What kinds of decisions do teachers make during classroom interaction?" The focus was on the frequency and nature of decisions made under relatively standardized conditions. In contrast, the information-processing study sought to investigate "the kinds of information teachers processed during instruction and the ways in which the information was processed" (MacKay & Marland, 1978, p. 2). Teacher interactive decisions were certainly of interest in this study, but they were only part of a much broader research topic.

Method

The primary methodological contrast between the two studies was the way in which the stimulated recall interviews were conducted. In the teacher decision-making study, each teacher viewed four brief (2-4 minute) segments of videotape selected more or less at random from the approximately 150 minutes of videotaped teaching. After viewing each of these segments, the teachers were asked four questions:

1. What were you noticing about the students?
2. How were the students responding?
3. Were you thinking of any alternative actions or strategies at that time?
4. Did any student reactions cause you to act differently than you had planned?

The assumption implicit in this method seems to be that interactive teaching is so rich in the kinds of decisions implied by the four questions that a small, random fraction of classroom interaction will yield important information about the variety, frequency, and effects of teacher interactive decision making.

The method of stimulated recall in the information-processing study was quite different. At the end of each videotaped school day, the interviewer previewed the videotape to identify segments that appeared most significant for investigating teacher interactive thought processes. These researcher-selected segments ranged in length from 20 to 30 minutes. The teachers were given an opportunity to view their own tape before the individual stimulated recall sessions began. In addition, they were informed prior to the start of the sessions that the purpose of the interview was to elicit thoughts, feelings, moment-to-moment reactions, conscious choices, alternatives condisered, and reasons for choices.

The teachers were placed in control of the videotape recorder unit and instructed to stop the tape whenever they wished to reflect on their thought processes. Although the interviewer did not control the videotape, he was prepared to ask about episodes that appeared rich in interactive data. Rather than asking a set of prescribed questions, the interviewer proceeded in a non-directive, clinical fashion, encouraging each teacher to say all that he/she felt inclined to say about his/her thoughts during the lesson segment under examination. As in the decision-making study, the stimulated recall interviews were audiotaped for later analysis.

Results

The results of the decision-making study were, of course, limited by the questions asked during the stimulated recall interviews. Among the primary findings was that the teachers considered alternative strategies only when they judged the instructional process to be going poorly; that is, the teachers were not trying to optimize instruction. It was also found that the primary cue teachers used in judging the success of the instructional process was student participation or involvement. Finally, it was discovered that teachers rarely deviated from their planned strategy, even when instruction was going poorly; that is, interactive decision making rarely resulted in an immediate change in the course of instruction. The interactive decision making of these teachers was characterized as a process of fine tuning and adaptation to aspects of the situation that were unpredictable in principle, such as specific student responses.

Marland's information-processing study using the more open-ended and exhaustive approach yielded findings on the content of teachers' interactive thoughts, function of teachers' interactive thoughts, individual dif-

ferences in teachers' interactive thoughts, and principles of teaching that influence teacher behavior.

The six teachers reported thinking about present, past, and future topics and events. Present events included student behavior, teachers' interpretations of student behavior, and the teachers' own affective states. Thoughts about the past included reflections on what had happened during previous presentations of the lessons, and retrieval from memory of factual information that might be useful in presenting the lessons again, such as personal information about particular students, curriculum content, principles of teaching, and beliefs about children. Teachers' thoughts about the future included tactics to be used next, predictions or visualizations of the directions that planned lessons might take, expectations for student behavior, and student learning objectives.

Interactive thoughts reported most frequently by the teachers were prospective tactical deliberations (20.3% of total thoughts reported), reflections (18.8%), perceptions (15.6%), interpretations (11.9%), and anticipations (8.7%). Interactive thoughts concerning information-pupil, information-other, and feeling accounted for between 5 and 10% of the thoughts reported. Relatively few thoughts in the remaining categories (retrospective tactical deliberation, goal statement, and fantasy) were reported.

Marland's data indicated that, in the majority of cases interactive thoughts served four major functions: (1) to correct or adjust the lesson when the lesson was not going smoothly, (2) to deal with parts of the lesson that were unpredicatble in principle (e.g., how to prompt a student who gave a partial answer), (3) to regulate own behavior by reference to certain principles of teaching, and (4) to adapt instruction to individual

students. Conspicuous by their absence from the teachers' interview protocols were four other possible functions: teacher self-monitoring, assessment of the accuracy of teacher interpretations of student behavior, consideration of alternative teaching tactics, and optimization of instruction.

Teachers in the study rarely gave any consideration to their own teaching style -- its effectiveness and impact on students. They tended to operate on the basis of hunches and intuitions about student cognitive and affective states rather than to treat first impressions as hypotheses to be tested by further observation or direct questioning. Teachers did think about tactical moves for lessons, but usually without considering alternatives. Finally, the teachers tended to be "satisficers" rather than "optimizers," that is, they tended not to think about improving instructional situations unless the instruction was going poorly.

Marland discovered an intriguing relationship between a teacher individual difference measure and the teachers' self-reports of their interactive thoughts. One teacher characterized as having an abstract belief system was found to be more open to making adjustments to expectations held for students than the other five teachers, all of whom were characterized as having concrete belief systems. No other systematic relationships between teacher information processing and teacher presage and contextual variables were reported.

Principles of teaching. Five principles of teaching were identified that seemed to have a profound influence on teacher behavior (or that were mentoned by at least two of the six teachers): the principle of compensation, the principle of strategic leniency, the principle of power sharing,

the principle of progressive checking, and the principle of supressing emotions.

Conclusions

The two studies described above are not offered as paradigms for the decision-making and information-processing approaches to research on teacher thinking. Rather, they are presented as typical examples of research guided by the dominant models. Methodological and substantive advances have been made in both camps. Research by Morine and Vallance (1975), Joyce, Morine-Dershimer, and McNair (1977), Shroyer (1978), and Conners (1978) reflects recent advances in simulated recall techniques. Work by Shavelson and his colleagues at UCLA (Shavelson, Cadwell, & Izu, 1977; Borko, Cone, Russo, & Shavelson, in press) reflects refinement of the substance and methodology of research guided by the teacher decision-making model.

My general conclusion is that research guided by a decision-making model of teaching tends to be highly controlled, focusing on the decision-making behavior of teachers in situations defined by the researcher. In contrast, research guided by the information-processing model tends to be descriptive; it explores the ways teachers define the situations in which they work and cope with an environment so rich in information that it far exceeds the processing capacity of the human mind. Both kinds of research are interesting, important, and promising ways of increasing our understanding of teacher thinking. It is crucial at this time to remember that researchers, too, operate in a world too complex to process fully. Models for simplifying that world must be chosen wisely and explicitly.

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